

[11] Patent Number: 5,379,338

[45] **Date of Patent:** Jan. 3, 1995

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Attorney, Agent, or Firm—Banner, Birch, McKie & Beckett

- [57]
- ABSTRACT**

- A radiotelephone of this invention comprises a sending-speech level varying circuit for varying the level of the sending-speech signal from the microphone and supplying the resulting signal and receiving-speech level varying means for varying the level of the receiving-speech signal demodulated by receiving means and supplying the resulting signal to the speaker, as well as a talking-mode setting section and a gain control circuit. At the talking-mode setting section, either the handset talking mode or the hand-free talking mode is set. At the gain control circuit, the gains of the sending-speech level varying circuit and receiving-speech level varying circuit undergo variable control according to the talking mode set by the talking-mode setting section. The gain control is carried out in such a manner that the gain becomes a first specific value when the handset talking mode has been set, and a second specific value larger than the first value when the hand-free talking mode has been set.

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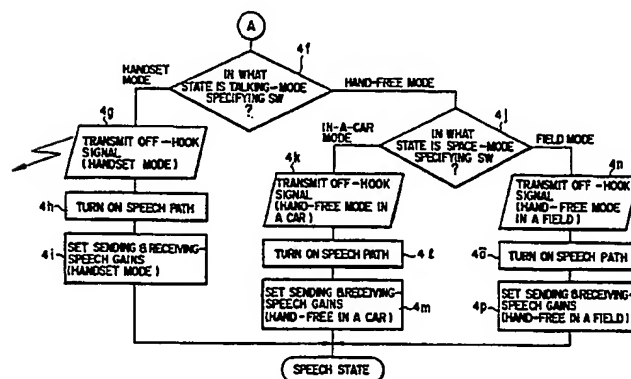
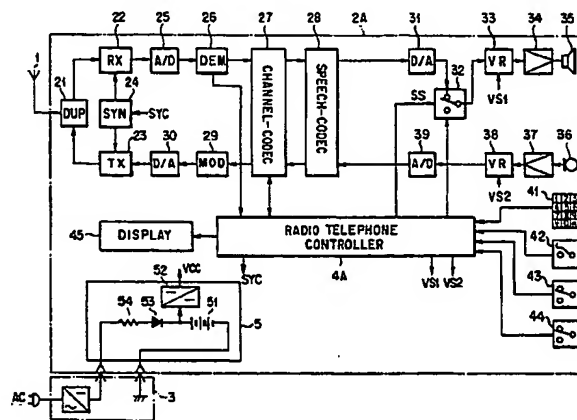
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29 Claims, 15 Drawing Sheets



US-PAT-NO: 5379338

DOCUMENT-IDENTIFIER: US 5379338 A

TITLE: Radiotelephone with handset talking function and
hand-free talking function

----- KWIC -----

Application Filing Date - AD (1):

19921001

Brief Summary Text - BSTX (8):

Many radiotelephones used in the portable and the cordless telephone system are of the hand-held type. Since this type of radiotelephone enables the speaker to make a call while holding the radiotelephone itself to his mouth and ear like the handset of a wire telephone, he can use it without a sense of incongruity, feeling it very useful.

Detailed Description Text - DETX (10):

The talking mode judging function judges whether the talking mode specified by the user is the handset talking mode or the hand-free talking mode from the changeover position of the talking mode specifying switch 43. The using space mode judging function judges whether the using space mode specified by the user is the in-a-car mode or the field mode from the changeover position of the using space mode specifying switch 44. The gain control function performs 3-stage variable control of the attenuation of the receiving-speech variable resistor 33 and sending-speech variable resistor 38, on the basis of the judgment results of the talking mode and the using space mode at the start of talking after an originating/terminating call and during conversation.

Detailed Description Text - DETX (24):

Here, for example, it is assumed that the handset talking mode is specified for the talking mode. Then, the controller 4A proceeds to step 4g, at which it produces an off-hook signal containing information showing the handset talking mode, and transmits this off-hook signal to the base unit 6. Next, at step 4h, it creates a speech path by setting a radio channel previously specified by the base unit 6 between the base unit 6 and itself. Then, at step 4i, the controller supplies gain control signals VS1 and VS2 for the handset talking mode to the receiving-speech variable resistor 33 and the sending-speech variable resistor 38, respectively. As a result, relatively large attenuations suitable for handset talking are set for the receiving-speech variable resistor 33 and the sending-speech variable resistor 38, respectively.

Detailed Description Text - DETX (27):

As a result of the judgment, the field mode suited for a relatively large space outdoors or indoors is assumed to be specified for the using space mode. Then, the controller 4A moves from step 4j to the step 4n, at which it produces an off-hook signal containing information showing the hand-free in a field mode, and transmits this off-hook signal to the base unit 6. At this time, the

off-hook signal is given information used to turn on the acoustic echo canceler 110 and delay information used to carry out initial setting of the echo canceler's characteristics. The delay information is made up of information on a processing delay time for each circuit of the sending and receiving speech system, and information on the acoustic echo path in the field space. These pieces of information are read from the RAM of the controller 4A. Finishing the transmission of the off-hook signal, the controller 4A goes to step 4o, at which it turns on a speech path by setting a radio channel between the base unit 6 and itself. Then, at step 4p, the controller supplies gain control signals VS1 and VS2 for the field mode and the hand-free talking mode to the receiving-speech variable resistor 33 and sending-speech variable resistor 38. As a result, attenuations suited for hand-free talking in the field space are set for the receiving-speech variable resistor 33 and sending-speech variable resistor 38. For the attenuation, a smaller value than the attenuation in the handset talking mode is selected. From now on, therefore, when talking is done in this state, the radiotelephone 2A produces a receiving speech with a sufficiently large sound volume suitable for the field space, or a sending speech signal of sufficiently high level. Consequently, the user can perform hand-free talking in the field space without any trouble.

Detailed Description Text - DETX (28):

In contrast, the in-a-car mode is assume to be set for the using space mode. Then, the controller 4A moves from step 4j to step 4k, at which it produces and transmits an off-hook signal to the base unit 6. At this time, the off-hook signal is given information used to turn on the acoustic echo canceler 110 and delay information used to carry out initial setting of the echo canceler's characteristics. The delay information is made up of information on a processing delay time for each circuit of the sending and receiving speech system, and information on the acoustic echo path in the in-a-car space. These pieces of information are read from the RAM of the controller 4A. Finishing the transmission of the off-hook signal, the controller 4A turns on a speech path by setting a radio channel between the base unit 6 and itself at step 4l. Then, at step 4m, the controller supplies gain control signals VS1 and VS2 corresponding to the hand-free mode in a car to the receiving-speech variable resistor 33 and sending-speech variable resistor 38. As a result, attenuations suited for hand-free talking in a car are set for the receiving-speech variable resistor 33 and sending-speech variable resistor 38, respectively. The attenuation is set to a value smaller than the attenuation in the handset talking mode and larger than the value for hand-free talking in the field mode. Therefore, the telephone 2A produces a receiving speech with a reasonably large sound volume suitable for the relatively small in-a-car space, and a sending speech signal of an appropriate level. Consequently, the user can perform hand-free talking in a car with the optimum sending and receiving speech characteristics.

Detailed Description Text - DETX (60):

Furthermore, while, in the above embodiments, a variable resistor has been employed as varying means for varying the level of the speech signal, the varying means may be other elements such as a variable attenuator, a variable amplifier, a combination of an amplifier and a variable resistor, and a combination of an amplifier and a variable attenuator. Any other combinations may be possible. A varying rate of the varying means may be 1.

Detailed Description Text - DETX (61):

FIG. 11 is a block diagram showing other elements as the varying means. In

FIG. 11A, the varying means are variable attenuators 100,101 controlled by a radio telephone controller. In FIG. 11B, the varying means are variable amplifier 102,103 controlled by radio telephone controller. In FIG. 11C, the varying means are a variable resistor 104 and a combination circuit 105 of a variable resistor and an amplifier. The variable resistor of the combination circuit 105 is controlled according to an output signal of a resistor controller 106. The resistor controller 106 compares a value of the level of an output signal from the amplifier with a reference value controlled by a radio telephone controller.

Claims Text - CLTX (7):

a speaker connected to said second level varying means, for producing a voice signal corresponding to the level-varied received speech signal;

Claims Text - CLTX (32):

a speaker, connected to said second level varying means, for producing a voice signal corresponding to the level-varied received speech signal;

Claims Text - CLTX (43):

a speaker, connected to said second level varying means, for producing a voice signal corresponding to the level-varied received speech signal;

Claims Text - CLTX (63):

a speaker, connected to said second level varying means, for producing a voice signal corresponding to the level-varied received speech signal;

Claims Text - CLTX (80):

a speaker, connected to said second level varying means, for producing a voice signal corresponding to the level-varied received speech signal;

Claims Text - CLTX (96):

a speaker, connected to said second level varying means, for producing a voice signal corresponding to the level-varied received speech signal;